

Translation

ENT COOPERATION TREATY

PCT/DE2003/000186



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 39 831 M/Hei	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DE2003/000186	International filing date (day/month/year) 22 January 2003 (22.01.2003)	Priority date (day/month/year) 23 January 2002 (23.01.2002)
International Patent Classification (IPC) or national classification and IPC B22D 41/50		
Applicant SMS DEMAG AG		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 20 August 2003 (20.08.2003)	Date of completion of this report 07 April 2004 (07.04.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.

PCT/DE2003/000186

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☒ the description:
 pages _____ 1-3 _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the claims:
 pages _____ 1-12 _____, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the drawings:
 pages _____ 1/1 _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
 These elements were available or furnished to this Authority in the following language _____ which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/DE/00186

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-12	YES
	Claims		NO
Inventive step (IS)	Claims	1-12	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-12	YES
	Claims		NO

2. Citations and explanations

1. Reference is made to the following documents:

D1: EP-A-0482423
D2: US-A-6152336
D3: US-A-5944261
D4: EP-A-0709153
D5: WO-A-9853938
D6: DE-A-19715826
D7: US-A-5961874
D8: EP-A-0403808

2. Novelty (PCT Article 33(2))

Contrary to what is indicated in the international search report, document D1 is not considered prejudicial to the novelty of the subject matter of claim 1 because the form of the base of the submerged nozzle in D1 (figures 3 to 5) is not a rotational solid of the rhomboidal aperture cross-section.

The subject matter of claims 1 to 12 therefore meets the requirement of novelty (PCT Article 33(2)).

3. Inventive step (PCT Article 33(3))

3.1 Document D5 (cited by the applicant) is considered to be the prior art closest to the subject matter of claims 1 to 12.

The difference between the present application and D5 is that the submerged nozzle for slabs is not cylindrical; instead, it has a circular cross-section that merges into a broader and flatter cross-section such that the long side is longer than the inlet diameter and the short side is shorter than the inlet diameter. This has the effect of optimising the melt flow when casting broad slabs. The problem addressed can therefore be seen as that of modifying the submerged nozzle known from D5 for slabs with large width-thickness ratios.

Documents D1 to D4 and D6 to D8 describe the known technical teaching according to which submerged nozzles for thin slabs, plates or steel strip should be designed with a circular inlet section that merges into a suitably broad and narrow section so as to ensure good low-swirl distribution of the melt flow towards the narrow sides of the mould. In all these prior art documents the end of the submerged nozzle has a *slit-like* geometry.

In claim 1 the form of the base and hence the cross-section of the aperture is *elliptical or oval*, which is not suggested by any of the cited documents.

It is thus possible to achieve the effect described in the application (page 3, line 3 ff.) of a broadening of the flow in the casting direction with a stronger backflow outside the submerged nozzle, which results in improved melting of the casting powder.

The subject matter of claim 1 therefore meets the requirement of inventive step (PCT Article 33(3)).

4. Clarity (PCT Article 6)

According to claim 1, the form of the base of the submerged nozzle is a rotational solid derived from an ellipse or an

oval aperture cross-section. This implies that the aperture cross-section itself must be elliptical or oval, since otherwise the base would not "fit". Dependent claim 3 is therefore unclear because it is not apparent how a rhomboidal aperture cross-section can merge into a base which has the form of an elliptical or oval rotational solid.

5. Dependent claims 2 and 4 to 12 relate to other embodiments of the submerged nozzle according to claim 1 and therefore also meet the requirements of PCT Article 33.